

# *International Space Station National Laboratory*

**BIOTECHNOLOGY SPACE RESEARCH ALLIANCE (BSRA)**



**SPACE TELESCIENCE & BIOTECHNOLOGY RESEARCH  
EDUCATION & STEM WORKFORCE DEVELOPMENT**

# *Why Biotechnology Wants to Use the ISSNL?*

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- ✧ **The International Space Station (ISS) is the largest international scientific project in history.**
- ✧ **The ISS draws upon the scientific and technological resources of 16 nations-United States, Canada, Japan, Russia, Brazil and the 11-member European Space Agency.**
- ✧ **The ISS is the world's only continuously inhabited outpost and laboratory in space.**
- ✧ **Unprecedented opportunity to achieve advances in research knowledge, commercial development, and STEM education in the United States.**

# *A Case for Biotechnology Research on the ISSNL*

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**There is compelling evidence that the unique environment of spaceflight provides important insight into a variety of fundamental human health issues with tremendous potential for the commercial development of novel enabling technologies to enhance human health here on Earth**

- ❖ Infectivity & Infectious Diseases**
- ❖ Cell Tissue Engineering**
- ❖ Biological Processes in Aging**
- ❖ Biophysical Reactions to Weightlessness**
- ❖ Macro-molecular Crystallization**

# *A Case for Commercial Biotechnology on the ISSNL*

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**The U.S. Government (Congress and NASA) is prepared to:**

- **Facilitate the utilization of the ISSNL by other Federal entities and the private sector through partnerships, cost-sharing agreements, and any other arrangements;**
- **Support the development of a Commercial Orbital Transportation System (COTS);**
- **Develop a STEM workforce development environment in conjunction with the ISSNL.**

# *A Case for Education & STEM Workforce Development on the ISSNL*

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- **The America Competes Act of 2007 highlights the importance of the role of education in ensuring the Nation’s future economic health.**
- **The ISSNL has the potential to encourage all learners to acquire skills in STEM fields; to engage, educate, and train learners of all ages for employment in STEM fields and to reach students of all ethnic, racial, and economic backgrounds.**
- **ISSNL Education Coordination Working Group Report to Congress – An Opportunity To Educate: International Space Station National Laboratory**
- **Space Grant led “RosettaSpace” Project**

# *ISSNL Background*

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- **Dec '05 Authorization Act designated ISS as a *national laboratory*.**
- **Oct '06 Administrator Letters of Invitation issued to USG agencies.**
- **Apr '07 Report on ISS applications development delivered to Congress.**
- **Aug '07 Announcement of Opportunity for R&D on ISS issued.**
- **Began signing formal agreements in September '07**
  - **National Institutes of Health**
  - **Bioserve Space Technologies, University of Colorado**
  - **Spacehab, Inc.**
  - **Zero Gravity, Inc.**
  - **US Department of Agriculture, Ag Research Service**
  - **Ad Astra Rocket Company (pending)**
- **First self-organizing, multi-sector strategic alliance formed in Mar '08**
  - **Biotechnology Space Research Alliance, San Diego, CA**

## *ISSNL Background*

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- **Congressional hearing in Apr '08**
  - **US House of Representatives Science & Technology Committee - Space and Aeronautics Subcommittee**
- **BIO 2008 June**
  - **BSRA formally announced at International BIO Exhibit. Joe Panetta (CEO of BIOCOM), Vickie Bradshaw, California Secretary of Labor and Workforce Development and Matt Gardner (BAYBIO) attended.**
- **SPACE 2008 September**
  - **BSRA formally presented in Public Policy track of Space 2008.**



# ***ISSNL Opportunity for the Biotechnology Space Research Alliance (BSRA)***

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**Pursue and Capture the International Space Station National Laboratory Opportunity for Research (Telescience, Biotechnology, Nanotechnology, Telemedicine), Workforce Development, and Education**

**Return shall be measured in terms of:**

- **Breakthrough Intellectual Property derived from the research;**
- **Job Creation;**
- **Workforce Creation (scholarships & fellowships, internships);**
- **Regional High Technology Industry Branding;**
- **Residual Assets available to capture future business; and**
- **An effective K-12 Outreach & Education Program both enabling and inspiring the future STEM workforce.**



# *Regional Biotechnology Space Research Alliance (BSRA) Program Elements*

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## San Diego BSRA Regional Team Program Elements

- **Establish a distributed network program capability that utilizes the UCSD – CalIT<sup>2</sup> capabilities.**
- **Establish a Tele-Medicine/Tele-Research/Tele-Science capability (Biotech portal) in San Diego Region.**
- **Establish an Education and Outreach capability (physical and virtual sites) within the region.**
- **Create a virtual and physical knowledge harvesting capability within the team providing input to guide research teams and grants.**



# *San Diego Partnership for ISSNL - BSRA*

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## ✧ **Initial Space Telescience - Biotechnology Space Research Alliance (BSRA) Partners**

- **BIOCOM**
- **UC San Diego**
  - ❖ **Jacobs School of Engineering & industrial partners**
    - **CalIT2**
    - **BioEngineering**
    - **Mechanical & Aerospace Engineering**
  - ❖ **School of Medicine**
  - ❖ **CONNECT**
  - ❖ **California Space Grant Consortium**
- **San Diego State University**
- **San Diego Regional Economic Development Corporation**
- **STEM Workforce Development Organizations in San Diego**
  - ❖ **Space Grant Education and Enterprise Institute (SGEEI)**
  - ❖ **BIOCOM Institute**
- **NASA**



## *San Diego Regional*

# *Biotechnology Space Research Alliance (BSRA)*

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- **Self organizing entity**
- **MOU signed April 1, 2008**
  - **BIOCOM (>500 biotech industry members)**
  - **University of California at San Diego**
    - **Health Sciences School**
    - **Jacobs Engineering School**
    - **California Board of Regents**
    - **Howard Hughes Medical Institute - Science Education**
    - **San Diego Regional Economic Development Corp.**
- **NASA will enter into SAA for use of ISS in post assembly period once specific funded R&D objectives are identified**
- **Current alliance objective is for the southern California area to become the global leader in space-based biotechnology**

## ***BSRA - Why San Diego is a Leader?***

### **Key Elements for a World-Class Life Science Cluster**

- **Science**
  - ❖ **Bio-Research Centers, Biotech R&D Assets, Effective Tech Transfer**
- **Talent**
  - ❖ **Training/Education Infrastructure**
- **Money**
  - ❖ **> \$900M Federal & State Research Funding, > \$1.2B in VC funding**
- **Infrastructure**
  - ❖ **Broad Areas of Research, Large Concentration of Biotech Industry, BIOCOM - Largest Regional Trade Association in the World - Over 575 Members**

**The San Diego key element...**

**Collaboration!**

# **Networking Regional BSRA Partnerships Across the United States**

- **Identify World-Class Life Science Clusters Across the United States**
  - **Science - Talent - Money - Infrastructure**
- **Establish Partnerships Based on Near- and Long-Term Research, Commercial, and Educational goals of each Regional Team**
- **Establish Advanced Communications Capabilities (CalIT2 technologies) at each Regional BSRA Site for Telescience (Tele-design, Tele-integration, Tele-operations, Tele-analysis) applications**
- **Form a National Economic Political Coalition to Assure Sustained Support for Life Science Applications on the ISSNL**
- **Establish a Sustainable National Scholarship - Fellowship Program Interconnecting BSRA Students across the Nation**

# **Issues to Address & Barriers to Overcome**

- **Close the Business Case for Commercial Biotech on the ISSNL**
- **Simplify the User Interface for the ISSNL**
- **Involvement of U.S. and U.S. Trained Foreign Students in ISSNL projects**
- **Statement to Ponder: Engineers Build Marvelous Machines and Structures — Customer-Oriented Management Should be Left to Others**